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Bulletin of INDIAN RAW MATERIALS & THEIR UTILIZATION

SERIES B

(Current Literature on Raw Materials other than
Medicinal & Aromatic Plants)



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BULLETIN OF INDIAN RAW MATERIALS & THEIR UTILIZATION

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Chief Editor
Y.R. Chadha

Editor
S. Nagarajan

Associate Editors
K.N.N. Nayar
Kuldip Chandra Gulakh

Series B: Current literature on Raw
Materials other than Medicinal & Aromatic Plants

Contributors
Mrs S.P. Mehta
S. Balakrishnan

Documentation Assistant
A.S. Sidhu

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EDITOR'S NOTE

Bulletin is now two years old. It is gratifying to note that within these two years this bulletin has established itself in the scientific community in India and abroad. The number of technical enquiries and requests for xerox copies of documents received reveal that this bulletin is serving its purpose for which it was started in 1974. In order to make this service more comprehensive and meaningful it was thought appropriate to bifurcate this bulletin, beginning from Jan. '77, into two series, viz. 'A' - dealing with current literature on all aspects of medicinal and aromatic plants and 'B' dealing with raw materials (other than medicinal and aromatic plants). Coverage of these two series has also been enlarged.

In order to defray the cost of paper and production of this bulletin it is also decided to charge a nominal amount of Rs. 10/- per series as annual subscription from those who have desired to continue to get copies of this bulletin.

It is, therefore, requested that this subscription amount of Rs. 10/- for the year 1977 may please be sent either by M.O. or postal order payable to Publications & Information Directorate (MAPIS), Hillside Road, New Delhi-110012.

All users of this bulletin may please remit this amount as early as possible to ensure continuous supply of copies of this bulletin.

EDITOR

C O N T E N T S
Numbers refer to pages

Rural Development Series : 1 - Cheap Power Sources 1-4

RAW MATERIALS (including chemical constituents)

Animals & Animal Products

Fish	-
Livestock	5
Poultry	6
Others	-

Marine Products

-

Minerals & Ores

-

Plants & Plant Products

Beverages	7
Carbohydrates (Sugars, Starches & Pectins)	7
Dyes, Tans & Other Pigments	-
Fats, Vegetable Oils & Waxes	8
Fibres & Pulp	-
Fruits & Nuts	11
Gums, Latex & Resins	-
Vegetables	-
Wood & Timber	-
Others	-

UTILIZATION

Agro-based Industries

Field Crops	11
Industrial Crops	12

Animal-based Industries

Dairy	12
Fishery	-
Leather	12
Meat	13
Sericulture	13
Others	14

Chemical & Allied Industries

Agrochemicals	14
Chemicals	15
Dyes	16
Fats & Oils	-
Fuels	-
Industrial Gases	-
Paints, Varnishes, Resins & Adhesives	17
Perfumery & Cosmetics (Synthetic)	-
Petrochemicals	-
Plastics & Other Macromolecules	17
Soaps & Detergents	-
Others	18

Engineering Industries

Electrical & Electronics	19
Energy	20
Industrial Coatings & Linings (Electroplating)	20
Instruments & Instrumentation	-
Mechanical	20

Food & Beverage Industries

Bakery & Confectionery	-
Feed & Fodder	-
Food & Spices	-
Sugar	-
Wine	-

Forest-based Industries

Paper, Board & Pulp	24
Plywood, Timber & Woodcraft	-
Others	21

Mineral-based Industries

Building Materials	22
Clays & Refractories	-
Coal	22
Glass & Ceramics	23
Iron & Steel	-
Mining & Metallurgy	24
Petroleum	24
Precious Stones	-
Others	-

Pharmaceutical Industries

Synthetic	-
-----------	---

Textile & Cordage Industries

Cotton	24
Handloom	-
Man-made	25
Readymade Garments	-
Silk	-
Special Fabrics	-
Woollen	-

Waste Products Recycling Industry

Agricultural	25
Animal	-
Industrial	25

Miscellaneous Industries

NEWS & NOTES

28-29

KEYWORD INDEX

30-36

RURAL DEVELOPMENT SERIES

I. CHEAP POWER SOURCES

S. Balakrishnan

The fast depletion of fossil fuels accompanied with its high cost and its pollution consequences, the nuclear energy with its high cost and safety hazards, and the ever increasing energy demands of the urban areas have brought the rural areas in an unenviable position for meeting their demands of energy from their own available cheap sources easily replenishable and free of pollution. The situation is very acute in a developing country like ours, whose identified energy sources are meagre about 50 per cent of which is also grabbed by 6 per cent of the total population living in big cities for their own use.

The manmade energy crisis has accentuated the woes of the villages. Of course, their energy needs can be met with coal. But all villages in India are not fortunate enough to be situated in the vicinity of the coal-belt. Wherever economically suitable, the available power is man or animal powers which has its own limitations.

To do justice to rural development in terms of power, it is imperative to use a suitable technology. Sheer perseverance of man to keep the natural processes going with the proper ecological balance can save the situation.

Science and technology can certainly contribute for rural developments to achieve selfsufficiency in power supply. Their power in modernising societies and improving the standard of life is well known. They can play an important role in the future agricultural and industrial developments of the rural areas.

As nearly 80 percent of our population lives in the villages, their needs of power are to be analysed. Energy is needed for cooking and lighting, for operating pumps for irrigation and drinking water, for drying agricultural produce and for warming the houses in winter if not for cooling in summer.

The National Committee on Science & Technology (NCST) appointed experts to probe the economical potential sources of power. The Committee examined in detail the potentialities of solar power, wind power, geothermal power, biogas power, etc. The different sources which could be harnessed for rural development are discussed as under :

SOLAR POWER

Solar energy offers considerable promise in India. It is available in abundant measure, in almost all parts of the country. If proper technology is developed to harness economically, solar power can transform the rural scene completely.

Attempts at using solar energy have been going on all over the world for the last forty years. India is in more or less the same level of development in these fields as others are in advanced countries. At present the cost of this energy is considerable and is comparable with the other sources of energy. There is considerable scope in saving costs with the progress in research and development in this field.

In solar energy research, the end point may be heat or electrical energy, whether the conversion steps are interposed or not. Its use does not add or subtract anything to the environment, only additional steps are interposed in the conversion from the solar energy finally to heat. Efforts should be directed at converting solar energy into forms needed for the daily life of the rural areas. The conversion should be done with the fewest possible steps along the most direct route.

Basic research in solar energy is carried out by our universities, institutes of technology and Research Institutes. Public sector undertakings like Bharat Heavy Electricals Ltd. and Central Electronics Ltd. have been identified for carrying out coordinated programmes of research and development in this field with basic research support from other institutions.

Solar appliances - With an eye on rural development, solar energy research is being actively pursued in the fields of developing solar pumps and solar driers for drying agricultural produce and forest timber; for the use of solar energy for desalination of water and conversion of brackish water into potable water; use of solar energy for power generation; solar water heaters; development of solar cells for the direct conversion of solar energy into electricity; and for utilising solar energy for the heating and cooling of houses.

Solar pumps - A prototype of a solar pump has been developed by CMERI, Durgapur. This pump works on a vapour cycle by evaporation and condensation of a highly volatile low boiling liquid. The evaporation and condensation are achieved by using the temperature difference between a flat solar collector and water at ordinary temperature. The device consists of,

two major parts 1) solar energy collector and evaporator, 2) actuation chamber cum condensor.

The equipment is capable of drawing water from a lower depth and delivering it at a higher level. This experiment can be adopted to suit the requirement of lighting as well as transporting liquid on a larger scale. Components to be used in such prototype will all be indigenously available.

No conventional engine or pumping system is necessary for such a solar pump, and use of costly fuel is completely eliminated. In the field of transport sector, it can be used for low cost turbo-charges for saving fuel and augmenting shaft power. It has a promising future as it will be used in remote villages throughout the country. In view of the potential for their application in agricultural pumping, development of solar pumps have been given high priority. Eight institutions are working for the development of such pumps, with capacity 3-5 horse powers. The possibility of developing larger pumps are also kept in view.

Solar power stations - Research in the field of 'solar power station is being planned in a phased manner. It is proposed to develop in the first instance units of 10 to 20 KW. This prototype may come up in Madras at I.I.T., Madras, is doing pioneering work with a possibility of collaboration with West Germany.

On the whole there are 25 principal research stations in India, handling 12 research and development projects supported by various industries.

WIND POWER

Another potential power source for the rural areas is the wind power. The experts committee of the NCST has identified applications of wind power via wind mills in respect of water pumping; for electricity generation in a complementary form to solar energy power. There are many places in India where it should be profitable to use the wind-mills for irrigation - along the sea coast, over the parts of Gujarat, Maharashtra, Rajasthan and many other hilly areas.

It will be found that the wind mills if not ideally suitable machines for lifting water, are by far the best and the cheapest of the mechanical devices available. While the wind mill could answer the power crisis, whatever they could generate would be clean and at the same time will help saving some of the precious fossil fuels. Wind mills could be profitable for

village lighting purposes. NAL, Bangalore is engaged in harnessing this cheap source of power. A 10 KW vertical axis wind generator is the aim of research at I.I.T., Madras and BHEL.

GEOTHERMAL POWER

This power potential is feasible only in those rural areas which are blessed with hot springs. The areas which are identified for further studies research are the hot spring regions of the Himalayas; Naga and Lushai Province; the West coast geothermal areas between west coast and western ghats where there are 33 springs; some areas in Bihar; the Narmada-Tapti zone; and the Andaman Nicobar geothermal province. The Puga valley in Ladakh holds considerable promise for power generation. A pilot plant will be set up at Manikaran by I.I.T., Delhi and the Geological Survey of India.

BIOGAS POWER

With the declining availability of firewood, charcoal, coal and mineral oils for the rural areas, the technology for production of biogas from animal wastes, has caught the attention of scientists. It has been regarded as the appropriate technology having far reaching consequences in the techno-economic perspective of the developing country like ours. With this technology enough power is available for cooking and lighting; it also enables the production of organic manure which will go a long way in the augmentation of the shortfall in inorganic fertilizers.

The Khadi and Village Industries Commission has given support for the expansion of this cheap technology in the villages. It is interesting to note that the profitable functioning of thousands of biogas plants in Indian village has caught the attention of scientists in the advanced countries also.

It is recently reported that the streets of 15 villages in Haryana will soon be lighted by gas lights which would draw their source of power from human waste. Community latrines and fermentation plants in these villages will convert night soil into gas for streetlighting and household use. The smallest gas plant adequate for the fuel needs of a family kitchen requires a latrine used by about fifty persons.

Conclusion

Given financial support, organization and coordination of efforts, and dedicated and sustained work, on the part of scientists and technologists, natural resources can be suitably and profitably exploited for the rural development.

RAW MATERIALS
(including chemical constituents)

ANIMAL & ANIMAL PRODUCTS

Livestock

1. Arora, C.L. & Acharya, R.M. (Cent.Sheep & Wool Res.Inst., Avikanagar-304501): Improvement of Mandya sheep in Karnataka : a review. Indian J.Anim.Sci., 1976, 46(7), 340-45

Mandya is found to be superior in dressing percentage to other Indian muttontype breeds. Improvements in productivity through selection within breed and through cross-breeding with exotic mutton breeds have been discussed.

2. Diwan, J.G. & Deshpande, K.S. (Dep.Surg., Vet.Coll., Bombay): Sterilization of scrub bulls in cross breeding programme. Indian vet.J., 1976, 53(1), 804-05

Ninety-eight bulls were caudectomized under village conditions. The merits and demerits of the sterilization are discussed.

3. Jayal, M.M. & Johri, S.B. (Indian Vet.Res.Inst., Izatnagar): Agro-industrial by-products as livestock feeds. Dried and ground tomato-pomace with concentrates for ruminants. I. Indian vet.J., 1976, 53(10), 793-98

Results of feeding revealed that sheep recorded significantly lower digestibility co-efficient for proximate principles of the ration containing tomato-pomace than those fed concentrate mixtures.

4. Kuber Ram, Singh, K. & Tomer, B.S. (Nat.Dairy Res.Inst., Karnal 132001): Profitable level of milk production in different breeds of cattle. Indian J.Anim.Sci., 1976, 46(6), 283-88

Studies were conducted on the yield of milk in different breeds of cattle, maintained at Karnal. The optimum level of milk production showing the minimum per litre cost was 9.11, 7.24, 6.90 and 6.43 litres in cross-bred, Red Sindhi, Sahiwal and Tharparkar breeds respectively under existing conditions of feeding and management.

5. Parthesarathy, M. & Prasad, D.A. (Coll.Vet.Sci., Tirupati 517502): A note on nutritive value of laying hens' litter for sheep. Indian J.Anim.Sci., 1976, 46(7), 375-77

Studies on the nutritive values of autoclaved laying hens' litter using adult Nellore rams were carried out. These revealed that feeding of 1.5 kg of any green and 200 g of autoclaved poultry litter plus 20 g molasses can maintain adult sheep.

6. Singh, B.P., Singh, M.R., Saxena, R.P. & Tyagi, J.C. (Dep.Anim. Genet. & Breed., Mathura): Relative breeding values of Haryana bulls. Indian vet.J., 1976, 53(10) 778-81

Progeny testing programme was undertaken at the State Livestock-cum-Agricultural Farms, Madhurikhund (Mathura), Babugarh (Meerut) and District Dairy Demonstration Farm, Mathura. The relative breeding values of the sires were calculated.

7. Singh, L.B., Singh, M., Dwarkanath, P.K. & Lal, A. (Coll.Vet.Anim. Sci., Bikaner): Haemoglobin variants of the indigenous, exotic and cross-bred sheep. Indian vet.J., 1976, 53(10), 766-71

In all 1351 samples of different breeds of sheep in Rajasthan were analysed and their haemoglobin contents were compared.

Poultry

8. Offiong, Samuel A (Federal Dept.Vet.Res.Poultry Res. & Prod.Unit, Vom, Nigeria): The effect of rations containing raw peanuts on the eating quality of broilers. J.Sci.Fd Agric., 1976, 27(8), 771-72

Effect of feeding diets containing 5, 10 and 12.5 percent raw peanuts on the flavour of broilers has been studied.

9. Shingari, B.K., Sandha, G.S., Gill, K.S. & Ichhponani, J.S. (Punjab Agric.Univ., Ludhiana): Nutritive value of triticale (Triticum durum x Secale cereale) used as chick feed. Indian J.Anim.Sci., 1976, 46(6), 299-302

Five varieties of triticale were evaluated for their nutritive value in egg- and meat- type chicks. The growth response indicated that the triticale can completely replace maize in the rations of chick.

PLANTS & PLANT PRODUCTS

Beverages

10. Coffee. Trop.Prod.Quart., 1976, 17(3), 367-93

Forecast of coffee for 1976-77 is estimated to be about 60 million bags; this is 12 million bags less than the revised estimate for 1975-76. Figures of production in India from 1969-70 to 1976-77 have also been given.

11. Cocoa. Trop.Prod.Quart., 1976, 17(3), 350-66

World production in 1975-76 is estimated at 1.52 million tonnes, 2 percent less than in 1974-75 but still sufficient to meet the demand from chocolate manufacturers, which in 1976 is about 1.50 million tonnes. Figures of import in India during Jan - March, 1975 have been given.

12. Chacko, M.J. (Cent.Coffee Res.Inst., Coffee Res.Stn, P.O., 577-117, District Chikmagalur, Karnataka): Possible causes for the outbreak of coffee white stemborer. Indian Coffee, 1976, 40(12), 348-49

The uprooted stems harbour the larvae and pupae of the white stem-borer and therefore the further development takes place in the freshly cut or drying wood during six months or less. Thus storing of borer-infested stems results in the development and emergence of them as adults.

13. Chacko, M.J. & Ramanarayana, E.P. (Cent.Coffee Res.Inst., Coffee Res.Stn, P.O. 577117, District Chikmagalur, Karnataka): Insecticidal control trial against Melanagromyza coffeae. Indian Coffee, 1976, 40(12), 347-49

Carbohydrates (Sugars, Starches & Pectins)

14. Agarwal, M.L. & Mathuria, R.S. (Sugarcane Res.Stn, Shahjahanpur): Intensive cropping with autumn planted sugarcane. Cane Grower's Bull., 1976, 3(4), 5-8

Cane yield and sugar recovery can be increased by 25 and 5 percent respectively by changing the time of sugarcane planting from spring to autumn (Sept. - Oct.). Autumn planting of sugarcane inter-cropped with a crop during rabi is advocated.

15. Rao, P.N., Rao, B.R. & Rao, B.A. (Reg. Agric. Res. Stn, Rudrur): Effect of glyphosine on sugarcane quality. Cane Grower's Bull., 1976, 3(4), 1-4

Sprays of glyphosine (polaris) are effective in hastening maturity and is distinctly more beneficial for sucrose increase than for enhancing yields.

16. Singh, S.P. (Plant Propagation & Floriculture Lab., Nat. Bot. Gdns, Lucknow): Effect of farmyard manure and nitrogen on potato (Solanum tuberosum L. var. Kufri Sinduri (C-140)). Madras agric. J., 1975, 62(8), 504-07

Growth and yield potential of the plants as a result of application of FYM and nitrogen are discussed.

Fats, Vegetable Oils & Waxes

17. Grinding/lapping compounds from palm oil sludge. SENDOC Bull., Ind. & Tech., 1976, 4(7), 17-18

Regional Research Laboratory, Bhubaneswar has developed a process in which waste palm oil sludge after physical beneficiation (removal of dirt, grits and water) is taken as a substitute for petroleum grease in the manufacture of grinding/lapping compounds.

18. Vegetable oils and oilseeds. Trop. Prod. Quart., 1976, 17(3), 291-349

World production of the major vegetable oilseeds and olive palm and tung oils is given. For India, statistics regarding area and production of oilseeds, groundnuts (unshelled), rape and mustard seed, sesame seed, linseed and castor seed from the year 1973-74 to 1975-76 has been given.

19. Aiyasamy, P.K., Varadarajan, S. & Sundaresan, R. (Dep. Agric. Econ., Tamil Nadu Univ., Coimbatore): Economics of sunflower. Madras agric. J., 1975, 62(8), 468-73

Study has shown the relative profitability of sunflower and the potential of the crop to fit in the existing crop mix in Tamil Nadu.

20. Kurian, C., Antony, J., Abraham, V.A. & Natarajan, P. (Cent.Plant. Res.Inst., Kayamkulam, Kerala): Pest management in coconut gardens, an integrated approach. Indian Fmg, 1976, 27(9), 31-35
21. Nambiar, M.C. (Cent.Plant.Crops Res.Inst., Kasaragod). Sixty years of coconut research in India. Indian Fmg, 1976, 27(9), 5-7
22. Radha, K & Shanta, P. (Cent.Plant.Crops Res.Inst., Kayamkulam, Kerala): Root wilt disease, problems and perspectives. Indian Fmg, 1976, 27(9), 27-30
23. Singh, B.C. (Nimbker Agric.Res.Inst., Phaltan, Maharashtra): Prospects of sunflower in India. Khadigramodyog, 1976, 23(3), 165-67

An increase of 20 to 25 lakh tonnes in the supply of oil is necessary over the next 15 years. One of the possibility for raising the availability of oil is sunflower cultivation on a commercial scale in the country.

24. Srivastava, V.K., Hill, D.C. & Slinger, S.J. (Dep.Nutr., Univ. Guelph, Ontario N1G 2W1): Comparison of some chemical characteristics of Indian and Canadian Brassica seeds. Indian J.Nutr.& Dietet., 1976, 13(10), 336-42

Indian brassica seed meals were rich in glucosinolates while genetically selected Canadian tower meal showed small amounts of it. All mustard seeds showed butenylisothiocyanate while rapeseed cvt target showed goitrin as well as butenyl and pentenyl isothiocyanate. Fatty acid analysis of mustard seed oil as compared to rape seed oil showed lower concentration of palmitic and oleic acid but a higher level of erucid acid. cv Tower showed a very small amount of erucid acid but was highest in oleic acid. Amino acid analysis indicated that the protein of the Canadian seed meals was higher to arginine and lower in aspartic acid compared to the Indian seed meals.

25. Pulp and paper from indigenous materials. Econ. & Commer. News, 1976, 6(52), 9

Know-how has been developed for the production of industrial grade pulp and paper from Indian plants, by some CSIR laboratories. Progress made at NCL, Poona and RRL, Jorhat and Hyderabad is reported.

26. Banerjee, G.C., Mukherjee, A., Mandal, L. & Sahu, S. (Univ. Kalyani, Kalyani 741235): A note on the nutritive value of rice bean (Phaseolus calaratus Roxb.) as fodder for adult sheep. Indian J. Anim. Sci., 1975, 46(2), 87-88

Rice bean (gai-kalai) is successfully cultivated as a forage crop during summer and autumn in West Bengal. Nutritive values of this crop have been analysed and compared.

27. Matai, S., Bagchi, D. & Chanda, S. (Indian Stat. Inst., Calcutta): Effects of seed rate, nitrogen level and leaf age on the yield of extracted protein from five different crops in West Bengal. J. Sci. Fd Agric., 1976, 27(8), 736-42

Yield of leaf protein from bajra (Pennisetum typhoideum Rich.), mustard (Brassica nigra Koch), hybrid Napier (Pennisetum typhoideum x P. purpureum) and turnip (Brassica rapa L.), and ragi (Eleusine coracana Gaertn), grown at different seed rates and nitrogen levels was studied.

28. Muthuswamy, P., Govindaswamy, M. & Krishnamoorthy, K.K. (Tamil Nadu Agric. Univ., Coimbatore): Effect of stage of cutting on the crude protein Ca and P content of lucerne (Medicago sativa L.) varieties. Curr. Sci., 1976, 45(21), 765-66

Crude protein, phosphorus and calcium contents of 15 cultivars of lucerne were studied at monthly intervals.

29. Shankaranarayan, K.A., Dadaghao, P.M. (late), Upadhyay, V.S. & Rai, P. (Indian Grassland & Fodder Res. Inst., Jhansi): A note on the utilization of spear grass pasture, monthly variations in yield, chemical composition and performance of wethers. Indian J. Anim. Sci., 1975, 45(2), 92-95

Forage production, chemical composition and nutritive value of the grass are given. Wool production (seasonwise) in the upgraded sheep, fed on this grass, is also tabulated.

30. Verma, S.C., Banerji, R., Misra, G. & Nigam, S.K. (Nat.Bot.Gdns, Lucknow): Nutritional value of Moringa. Curr.Sci., 1976, 45(21), 769-70

Fatty acid composition of the seed fat of Moringa oleifera and M. c. nemensis by GLC has shown that the fats are rich in oleic acid. Moisture and vitamin C contents of the fresh leaves as well as pods of various clones at two different stages, i) tender and soft, ii) mature and hard were determined.

Fruits & Nuts

31. Das, R.C. (Dep.Agric., Orissa Univ.Agric & Tech., Bhubaneswar): Effect of growth regulants and nitrogen on growth, yield and quality of ribbed gourd (Luffa acutangula Poem) var. satapatria. Madras agric.J., 1975, 62(8), 463-67

Yield and quality of fruits record an increase.

UTILIZATION

AGRO-BASED INDUSTRIES

Field Crops

32. Solar drier for dehydration of fruits and vegetables. SENDOC Bull., Ind. & Tech., 1976, 4(7), 14-15

Regional Research Laboratory, Jammu has developed a low cost "Solar Cabinet Drier" which is used for dehydration of fruits and vegetables. The Drier works on natural wind and solar energy and hence the operational cost is negligible.

Industrial Crops

33. Misra, A.K. & Pandey, G.N. (H.B.Technol.Inst., Kanpur-2): Recovery of cardanol from cashewnut shell liquid. Chem.Age India, 1976, 27(11), 944-48

Recovery of cardanol from cashewnut shell liquid is discussed. The important parameters; e.g., pressure, temperature, residence time etc., have been studied over full practical range in batch as well as continuous systems : the latter system is recommended over the former.

34. Muliya, M.K. & Mathew, J. (Cent.Plantation Crops Res.Inst., Kasaragod): Problems of coconut industry. Indian Fmg, 1976, 27(9), 17-20

ANIMAL-BASED INDUSTRIES

Dairy

35. Bector, B.S. & Narayanan, K.M. (Nat.Dairy Res.Inst., Karnal): Chemical and nutritive changes in ghee during thermal oxidation. Indian J.Nutr. & Dietet., 1976, 13(9), 296-302

Heat treatment of cow and buffalo ghee for 2 hours at 200 to 225°C showed that some polymerisation of ghee took place and the polymeric material was found to be dimeric fatty acids.

Leather

36. Ahmed, T.K.R., Olivannan, M.S. & Selvarangan, R. (Cent.Leath.Res. Inst., Madras): Studies on substitution of chrome by aluminium in retanning of E.I. sheep skins into garment leathers. Leath.Sci., 1976, 23(9), 303-13

In order to prepare the E.I. leathers into garment leathers retanning them with basic aluminium salts rather than with chromium salts is recommended.

37. Doraiswamy, B. & Devassy, T.J. (Cont.Leath.Res.Inst., Madras):
Manufacture of lamp shade leathers. Leath.Sci., 1976, 23(8), 282

A process for the manufacture of parchment leather used in the making of lamp shades is described.

38. Rai, T.P. (Inform.Bur., Khadi & Village Ind.Comm., New Delhi):
Problems of losing skin. Khadi Gramodyog, 1976, 23(3), 168-71

Utilization of carcasses to the maximum with minimum environmental pollution has been discussed.

Meat

39. Rising demand for meat preparations. Leath.Sci., 1976, 23(9), 340-41

Foreign exchange earnings from meat and meat preparations of India have been nearly doubled from Rs. 52.50 million in 1974-75 to 103 millions in 1975-76.

40. Christopher, K.J. (Coll.Vet.Sci., Tirupati, A.P.): The economics of rabbit production. Yojana, 1976, 20(22), 41-42

Rabbits are good meat animals which can be easily bred in large numbers with little investment. Their skins are very valuable too.

Sericulture

41. Sericulture in eastern India. Jagriti, 1976, 21(1), 26,32
Bombay

42. Patel, A.R. (Agric.Fin.Dep., Bank of Baroda/): Sericulture : a labour intensive industry. Khadi Gramodyog, 1976, 23(3), 145-54

With about 1.50 lakh families engaged in cultivation of mulberry and rearing of silkworms about 2 million people are engaged in different branches of sericulture industry. Moreover with the invention of improved varieties, the land under mulberry cultivation yields four times the income that could have been possible by raising any other crop.

Others

43. Crushed bones in export trade. Leath.Sci., 1976, 23(9), 341-42

Substantial foreign exchange is being earned by India through exports of crushed bones (Rs. 56.76 millions for 41.05 million Kg. exported in 1975-76). Principal markets were Belgium, GDR, Japan, U.K.

44. Gobar gas for diesel unit. Jagriti, 1976, 20(2), 6

Gobar gas promises to reduce by 80 percent the consumption of diesel oil, used in diesel engines as worked out by the Mechanical Engineering Department, I.I.T., Bombay.

45. Gobar gas. Jagriti, 1976, 20(2), 24

Nine gobar gas plants were working in the beginning of 1975-76 and 16 more were added in the later part of the year in Delhi State.

46. Woollen carpets to world markets. Leath.Sci., 1976, 23(9), 342

India's export value of woollen carpets including namdas, rugs, d'uggets has been estimated at Rs. 400.00 million in 1975-76 as compared to Rs. 360.50 million in 1974-75. Two leading buyers of Indian carpets have been FDR and U.S.A. An Institute for Carpet Technology is expected to be set up to deal with problems connected with improving quality of Indian woollen carpets meant for export.

CHEMICAL & ALLIED INDUSTRIES

Agrochemicals

47. Biswas, A.K., De, A.B. & Das, T.K. (Dep.Bot., Burdwan Univ., Burdwan): Effect of Capton and Zineb on the leaves of soybean. Indian J.exp.Biol., 1976, 14(6), 718-19

Use of fungicides, Capton and Zineb in different concentrations sprayed to soybean leaves increased chlorophyll content and arrested senescence.

48. Gilbert, M. (Pesticide Residue Lab., Dept. Food Sci., Cornell Univ., Ithaca, New York): Fate of chlorothalonil in apple foliage and fruit. J.Agric.Fd Chem., 1976, 24(5), 1004-07

Chlorothalonil (tetrachloroisothalonitrile), a fungicide, enhances the growth regulating activity of ethephon (2-chloroethylphosphonic acid) resulting in more rapid apple fruit maturation.

49. Gill, K.S. IFFCO sets the pace in latest fertilizer technology. Lok Udyog, 1976, 10(9), S11-15

The design parameters for setting up a fertilizer plant, problems faced by IFFCO in setting up two plants and their locational logistics are discussed. The special features in the new ammonia, urea and NPK plants are described.

50. Kandasamy, D. & Prasad, N.N. (Dep. Microbiol., Fac. Agric. Annamalai Univ., Annamalai Nagar): Foliar spray of growth regulators on nodulation in three legume plants and its relation to Rhizobium population. Indian J.exp.Biol., 1976, 14(6), 737-39

Foliar spray of gibberellic acid and indole acetic acid on Phaseolus aureus, P. mungo and Crotalaria juncea caused variations in nodulation.

Chemicals

51. Chemical - Years of achievement. Chem.Petro-chem.J., 1976, 7(10), 3-7

The rapid growth made by some important inorganic and organic chemicals, dyes and dye intermediates and pesticides and the significant role played by the public sector units are discussed.

52. Carbon know-how for industry developed. Econ. & Commer.News, 1976, 6(48), 9-10

The success in producing active carbon from indigenous raw materials has brought India in the fore-front of carbon technology. The carbon know-how developed by some CSIR laboratories, for the various industries is reported.

53. : New metal products from CSIR laboratories. New Sketch, 1976, 37(12), 35

Several new metallic products have been evolved based on the research carried out in several CSIR laboratories. Their release for industrial production is also discussed.

54. Basu, D.R. & Seshadri, K. (Cent.Salt Marine Chem.Res.Inst., Bhavnagar): Studies on adsorption of iodine and bromine from aqueous solution on active carbon. Salt Res.Ind., 1976, 12(1), 23-26

Active carbon can be used for the adsorption of only iodine and not of bromine from aqueous solutions.

55. Chari, K.S. (Fertil.Ass.India, Near Jawaharlal Nehru Univ., New Delhi-57): Recent advances in sulphuric acid production. Chem. Age India, 1976, 27(11), 933-36

Based on thermodynamic considerations, the conversion efficiency of SO_2 to SO_3 and reduction of SO_2 emission into the atmosphere for sulphuric acid production are discussed. Latest trends in operation improvements in design and construction materials are also discussed.

56. Dav, H.M. & Sharma, N.N. (Cent.Salt Marine Chem.Res.Inst., Bhavnagar): Calcium sulphide from marine gypsum and Kutch lignite. Salt Res. Ind., 1976, 12(1), 11-14

Process for preparation of the chemical is described.

57. Vyas, M.H., Sanghavi, J.R. & Seshadri, K. (Cent.Salt Marine Chem.Res. Inst., Bhavnagar): Boric acid from borax. Salt Res.Ind., 1976, 12(1), 15-22

Method to separate boric acid from sodium sulphate is discussed.

Dyes

58. Phenacetin, P-acetamol and P-anisidine. SENDOC Bull., Ind. & Tech., 1976, 4(7), 4-5

Regional Research Laboratory, Jorhat has developed processes for the production of phenacetin, P-acetamol and P-anisidine starting from

p-nitro chlorobenzene, phenacetin and P-acetamol which are analgesic are presently imported. P-anisidine is used in dyestuff industry.

Paints, Varnishes, Resins & Adhesives

India's first maleic anhydride plant. Chem.Ind.News, 1976, 21(7), 519-21

Maleic anhydride finds wide application : manufacture of unsaturated polyester resins, alkyd resins, agricultural chemicals like malathion, paper sizes, latex paint vehicles and adhesives, food acidulants etc. M/S Adarsh Chemicals & Fertilizers Ltd., Udhna (Surat) expect India's first plant to go into production in January 1977, with a capacity of 300 M tonnes per annum. The process is based on the vapour phase oxidation of benzene in the presence of catalyst. The project is expected to be a major import substitution.

Hindustan Lever's Ossein Plant goes on stream. Chem.Ind.News, 1976, 21(7), 521

Hindustan Levers ossein plant has gone on stream at Talaja (Bombay) with a capacity of 3,000 tonnes of ossein and 6,000 tonnes of di-calcium phosphate (DCP) as a by-product. Both the products have a good export market : ossein for gelatine production and DCP as a nutritional additive in animal feed formulations. Crushed bones, hydrochloric acid and lime are the three major raw materials. Hitherto crushed animal bones collected from various areas of the country were exported for processing to developed countries.

Shetye, G.D. & Karnwal, R.S. (Dep.Chem.Tech., Univ.Bombay, Bombay): Novolac epoxy resins. Plast.Ind., 1976, 2(2), 11-16

Polyfunctional novolac epoxy resins exhibit some important improved properties in their applications as structural plastics. Methods for preparation of novolacs as also for the epoxidation of novolacs have been reviewed.

Plastics & Other Macromolecules

New strides in rubber and plastics technology. Econ. & commer.News, 1976, 6(48), 8-9

Self-reliance achieved by India in the sophisticated technology of industrial rubber, plastics and rubber is reported. Processes developed by few National Laboratories are reported.

63. Theberge, J., Arkles, B., & Robinson, R. (LNP Corporation, Malvern, Pennsylvania 19355): Carbon fiber reinforced thermoplastics. *Industr.Engng Chem., Prod.Res.Developm.*, 1976, 15(2), 100-14

These compounds are highly suitable where structural integrity, wear resistance and electrical conductivity are required.

Others

64. Maleic hydrazide. *SENDOC Bull., Ind. & Tech.*, 1976, 4(7), 3-4

National Chemical Laboratory, Poona has developed a process for the production of maleic hydrazide which is a plant growth regulator. It consists in treating hydrazine hydrate with maleic anhydride in the presence of mineral acids.

65. Gupta, S.K. (Vikram Sarabhai Space Centre, Trivandrum-22): Carbon fibres. *Chem.Age India*, 1976, 27(11), 961-74

Carbon fibre cloth has caught the attention of material engineers in diversified fields because the composites made by using it as reinforcement have high specific strength and stiffness. The article discusses their structure, chemistry and technology of preparation and utility.

66. Wood, J.G. (Weir Westgarth Ltd., Scotland): Water for middle east industry. *Chem.Age India*, 1976, 27(11), 937-40

Fresh water, enormously demanded by industry, can be met only by large-scale desalination of sea-water, in arid countries especially. Current desalination practices, in the middle east, are surveyed citing Jeddah (Saudi Arabia) and Ras Abu Fontas (Qatar) projects.

ENGINEERING INDUSTRIES

Electrical & Electronics

67. Technical assistance to develop micro computers. Econ. & commer. News, 1976, 6(52), 8

The reputed electronics firm M/S Electronics Corp. of India, Hyderabad, has developed know-how for prototyping systems, to facilitate development of user's own system. India's competence in making computers, commercial data processing equipment etc., are reported.

68. Mini ultrasonic cleaners. Instrum.India, 1976, 11(4), 22

Introduction of mini ultrasonic cleaners for cleaning jewellery, watches, intricate glasswares, etc., is reported.

69. Steady growth in production of power transformers. Commerce, 1976, 133(3413), 749-50

The technological advancement of the Indian manufacturers in the field of power transformers is described. Data on installed capacity, production, exports, imports are given.

70. SEEPZ scores. Econ.Scene, 1976, 1(12), 829

The electronics industry has shown a 20 per cent growth last year. The progress and achievements by the Santa Cruz Electronic Export Processing Zone is reviewed. The proposed electronics complex at different parts of the country are reported.

71. Bennett, G. Upheaval in microelectronics. Indian east Engr, 1976, 118(11), 519-21

Growth, uses and future of microelectronic gadgets are discussed.

Energy

72. Devin, B. & Mabile, M. Nuclear energy for petroleum exploration. Indian east.Engr, 1976, 118(11), 523-24

A general survey is made of the suitability and advantages of nuclear applications and the precise methods of use for exploring petroleum are indicated.

73. Vital role of power plant industry. Commerce, 1976, 133(3413), 743-

The present status of the power equipment industry in India is assessed and reviewed. The sophisticated equipment, catering to the needs of this industry in the organised sector is described.

Industrial Coatings & Linings (Electroplating)

74. Singh, D. & Singh, V.B. (Dep.Chem., Banaras Hindu Univ., Varanasi): Electrodeposition of nickel-cadmium alloy from acetate bath. Indian J.Technol., 1976, 14(4), 189-92

Studies on the electrodeposition of the alloys from a simple acetate bath under different conditions are reported.

Mechanical

75. Gurjar, M.N. Near the take-off stage. Commerce, 1976, 133(3422), 1097-99

The Indian Machine Tools industry, has had a planned development and at present very sophisticated machine tools are manufactured by H.M.T., Bangalore.

FOREST-BASED INDUSTRIES

Paper, Board & Pulp

76. Bin, P.T., Choon, K.K. & Wan, L.T. (For.Res.Inst., Koping, Malaysia): Pulping studies on empty fruit bunches of oil palm (Elaeis guineensis Jacq.). Malay.For., 1976, 39(1), 22-36

Fruit bunches are suitable for paper making especially for the manufacture of fine papers.

77. Guha, S.R.D., Singh, M.M. & Karira, B.G. (FRI & Coll., Dehra Dun): Pulping of hardwoods from Maharashtra for production of packing papers. Indian For., 1976, 102(12), 885-89

Pulps in satisfactory yield and strength properties can be obtained from mixed hardwoods of Anogeissus latifolia, Terminalia caribaea, Cleistanthus collinus, Madhuca longifolia var. latifolia and Diospyros melanoxylon growing in Eastern Maharashtra State by the old soda process, neutral sulphite semichemical process and kraft process.

Others

78. Ghosh, R.C., Singh, B. & Sharma, K.K. (F.R.I. & Coll., Dehra Dun): Effect of seed grading by size on germination and growth of pine seedlings. Indian For., 1976, 102(12), 850-58

A nursery study on Pinus roxburghii, P. caribaea & P. oocarpa show that medium sized seed gave higher mean total germination % and plant % as compared to large or small sized seeds. Seedlings of P. roxburghii had the highest root/shoot ratio and total biomass followed by P. oocarpa and P. caribaea.

79. Annual News Bulletin for the year 1975-76, Forest Research Institute and Colleges, Dehra Dun. 1. Directorate of Forestry Research, Minor Forest Products Branch - Resin tapping. Indian For., 1976, 102(12), 919

Pinus elliottii (an exotic) was found to give better yield of resin

than the Indian P. roxburghii. At Dehra Dun, during 1st tapping season, it gave 84.8 % more oleoresin than P. roxburghii by standard Indian tapping method.

80. Annual News Bulletin for the year 1975-76, Forest Research Institute and Colleges, Dehra Dun. Directorate of Forest Research, Cellulose and Paper Branch - Chemistry Forest Products Branch - Oxalic content of barks of Terminalia arjuna, T. tomentosa, T. belerica & T. chebula from U.P. Indian For., 1976, 102(12), 919-20

Oxalic acid from the barks of Terminalia spp. from I.D.P.L., Rishikesh was found to be 99.9 % pure and suitable for pharmaceutical purposes.

MINERAL-BASED INDUSTRIES

Building Materials

81. Bagchi, R.N. (Development Consultants Ltd., Calcutta): Coal and its effective utilization in cement manufacturing plants. J.Instn Engrs (India), 1976, 57(CH1), 11-13

Effective utilization and conservation of fuel in the cement manufacturing process are discussed.

Coal

82. Bose, B. (Retd Works-in-Charge, Durgapur Chemicals Ltd., Durgapur): Manufacture of textile dyes from coal chemicals. J.Instn Engrs (India) 1976, 57(CH1), 39-41

Dye industry thrives on coal chemicals.

83. Bose, P.K. (Indian Oxygen Ltd., Calcutta): Chemicals from coal... J.Instn Engrs (India), 1976, 57(CH1), 6-10

Recovery of different chemicals by distillation of coal is enumerated.

4. Chakrabarty, M.M., Lahiri, C.R., Raha, T.K. (Calcutta Univ., Calcutta): Coal chemicals as primary feedstock for pharmaceutical industry. J.Instn Engrs (India), 1976, 57(CH1), 14-19

Petrochemicals are the basic raw materials for the pharmaceutical industry.

5. Chandra, D. & Chatterje, K.K. (Indian School of Mines, Dhanbad): Eye coals from the Raniganj and Jharia coalfields. Quart.J.geol. Min. & Metallurg Soc.India, 1973, 45(2), 77-84

Occurrence of the eye coals have been recorded in India for the first time.

6. Ghosh, B.B. (Indian Investment Centre, Calcutta): Coal to fertilizer. J.Instn Engrs (India), 1976, 57(CH1), 25-26

The processes for the manufacture of synthetic gas from coal and petroleum based feedstocks are discussed.

7. Krishna, M.G. (Director, Cent.Fuel Res.Inst., Dhanbad): Utilization of coal. J.Instn Engrs (India), 1976, 57(CH1), 1-3

8. Saha, M. & Pillai, P.C. (Otto India (P) Ltd., Calcutta): Gas producer plants. J.Instn Engrs (India), 1976, 57(CH1), 36-38

As an alternative fuel coal has been found to be useful in producing gas of comparatively high calorific value.

Glass & Ceramics

9. Bullet proof glass for banks. Indian Ceram., 1976, 19(2), 454

Production of bullet proof glass for banks has been started in India by M/S Jeet & Jeez Glass and Chemicals Ltd., Haryana. The unit started in small scale sector, will help in saving valuable foreign exchanges by doing away with the necessity to import.

Mining & Metallurgy

90. Nickel plant by the year-end. Indian Ceram., 1976, 19(2), 474

India's first nickel plant at Sukinda, Orissa is expected to be commissioned by the end of 1976. This plant with a rated capacity of 4800 tonnes annually, will make use of Sukinda reserves of nickel.

Petroleum

91. Petroleum statistics. Chem.Petro-chem.J., 1976, 7(9), 27-30

Statistics for 1973-75 on production, consumption, import and export of crude oil and some petroleum products, and installed capacity and production for 1974-75 of some petrochemicals and dyes are given.

92. Substitute for furnace oil. Indian Ceram., 1976, 19(4), 537

Low-sulphur heavy stock (LSHS) has been suggested as an alternative fuel for furnace oil. This is a product of Indian Oil Corporation.

TEXTILE & CORDAGE INDUSTRIES

Cotton

93. Shah, R.C. & Trivedi, S.S. (ATIRA, Ahmedabad): Cost reduction in chemical processing. Indian Text.J., 1976, 87(2), 145-52

ATIRA has carried out research on various chemical processes in the textile industry with a view to reduce the cost involved. A brief review of this work is dealt with.

94. Design and development of caustic recovery plant by ATIRA. ATIRA News lett., 1976, 22(12), 3-4

In textile industry, caustic soda solution is used in mercerizing

machine to improve the properties of cloth. The caustic recovery evaporator made by ATIRA gives great saving in initial cost of the evaporation and the running cost of caustic recovery.

Man-made

5. Garware, A.B. (Garware Nylons Ltd., Bombay): Technological production changes in the nylon fibre. Indian Text.J., 1976, 86(8), 143-51

Though the size of the synthetic fibre industry is exceedingly small in India, technological changes have been rapid and note worthy.

6. Hagemann, R.F.A. (Du Pont De Nemours International S.A., Geneva) Economic impact on developing countries of man-made fibres in comparison with natural fibres. Man-made Text.India, 1976, 19(12), 640-43

Manufacturing facilities for synthetic fibres with respect to the developing countries are discussed. Suggestions are made for careful planning and the risks analysed.

7. Nadkarni, M.S. (Madras Refineries Ltd., Madras): Oil crisis : impact on synthetic fibres. Indian Text.J., 1976, 87(2), 177-81

The cost of imported crude oil and of man-made fibres in the world rose from about 16 per cent in 1950 to about 45 per cent in 1973. Conversion of crude oil to petrochemicals is gaining importance.

WASTE PRODUCTS RECYCLING INDUSTRY

Agricultural

8. The emergence of mango kernal cake. Econ.Scene, 1976, 1(12), 847

The solvent extraction industry has got good export potential. The entry of mango kernal cake for export and the performance of other conventional items are reviewed.

99. Basu, D.K. & Seshadri, K. (Cent.Sale Mar.Chem.Res.Inst., Bhavnagar): Mineral constituents of some of the fibro-cellular waste. Salt Res. Ind., 1976, 12(1), 45-46

Analysis of fibro-cellular waste materials was carried out and their mineral content is tabulated.

100. Jaeggle, W. Integrated production of furfural and acetic acid from fibrous residues in a continuous process. Chem.Age India, 1976, 27(6), 521-32

Fibrous wastes products are utilized for continuous production of furfural and acetic acid.

101. Singh, J. & Raman, S.K. (Dep.Chem.Engng, Indian Inst.Technol., Bombay): Utilization of undersized particles of coconut shell for production of activated carbons. Indian J.Technol., 1976, 14(3), 145-47

Process for producing active carbon from small particles of coconut shells is discussed.

Industrial

102. Acoustic tiles made from waste. Indian Ceram., 1976, 19(2), 478; 19(4), 537.

Production of flame proof, weather proof and sound proof tiles from waste glass and saw dust are reported.

103. Development of a cotton linters industry. Chem.Age India, 1976, 27(6), 562

Recovery process of cotton linters and their utilization in the making of rayon, bond currency, tissue paper and cellophane is outlined.

104. Ambekar, V.K. (Garware Nylons Ltd.): Recovery of caprolactam from nylon - 6 waste. Chem.Age India, 1976, 27(11), 958-60

Various methods for utilizing nylon waste are reviewed from literature and an improved method for recovery of caprolactam from nylon waste and extraction water from polymerization is described.

105. Dhandhukia, M.M. (Mrs.), Sanghavi, J.K. & Seshadri, K. (Cent.Salt Mar.Chem.Res.Inst., Bhavnagar): Iodine content in Indian petroleum oil well brines. Salt Res.Ind., 1976, 12(1), 47
- Iodine is recovered from the thrown out waste or brines @ about 1 Kg/day from Digboi wells and about 5.7 Kg/day from Ankleshwar wells.
106. Prabhudesai, M.K. (I.P.C.L., Jawaharnagar, District Baroda, Gujarat): Monitoring industrial waste water. Chem.Age India, 1976, 27(11), 941-43
- Various methods, (chemical, gas chromatographic, electrochemical and physical), are suggested for limitting the pollution by the waste waters.
107. Rao, G.S., Gokhale, Y.W. & Gupta, S.S. (Chem.Div., BARC, Trombay, Bombay): Recovery of selenium and tellurium from anode slimes. Indian J.Technol., 1976, 14(4), 201-03
- Wet chlorination under effective stirring conditions give upto 95 % recovery of selenium and tellurium from slimes obtained from Indian Copper Corporation.
108. Sarkar, S.B. & Sadhan, K.De (Chem.Dep., Indian Inst.Technol., Kharagpur): Compounding of natural rubber with lignins. Indian J. Technol., 1976, 14(3), 142-44
- Lignin compound acts more as an extender than as a reinforcing filter.
-

NEWS & NOTES

Opium Alkaloids Plant, Neemuch (M.P.)

Based on the technology developed at the National Chemical Laboratory, Poona, a plant for the extraction of important alkaloids in opium was set up in October, 1976 at Neemuch (M.P.) at a cost of Rs. 2.4 crores. The erection of this unique plant was carried out by the National Industrial Development Corporation on turn-key basis. This plant has a capacity to produce 8.7 tonnes of alkaloids of different kinds, valued at about Rs. 2 crores, which are extensively used in the medicine. (CSIR News, 1976, 36(24), 190).

CSIR Polytechnology Clinic

With a view to transfer technologies from laboratories to industries, the CSIR has launched a programme of opening polytechnology clinics in different parts of the country since 1975. One such clinic was opened at Bangalore in October, 1976. The Director-General of the CSIR, Prof. Y. Nayudamm speaking at the inaugural function spelt out five kinds of help offered by the CSIR which were relevant and appropriate both in rural and urban areas : i) on as is - where - is basis, ii) through a consultant mutually agreed upon by the CSIR and the entrepreneur, iii) the CSIR's readiness to invest half of the capital where the technology is considered risky with a proviso that the entrepreneur may buy the CSIR's share when the venture proves successful, iv) the CSIR's willingness to invest 26 per cent of the capital where the CSIR is confident of its technology but not the entrepreneur and v) to provide assistance on a turn-key basis on terms mutually agreed upon between the CSIR and the entrepreneur. (CSIR News, 1977, 27(2), 10).

New Potato Strains Evolved

The Regional Potato Research Station of the Central Potato Research Institute located at a village Badshapur, four miles from Jullundur, has developed some new strains of potato capable of higher yield of crops. (Economic Trends, 1977, 6(1), 11).

Steel Exports

India's exports of iron and steel for the period, April to November, 1976, have been 1.67 million tonnes worth Rs. 224 crores, showing an increase of 353 per cent over the corresponding period of the previous year in terms of quantity. (Economic Trends, 1977, 6(1), 26).

Waste Utilization

National Laboratories of India have shown encouraging research work relating to utilization of waste materials for the production of proteins, alcohol and other antibiotics. The National Committee on Science and Technology has accorded importance to the sector of waste utilization in the country's science and technology plans. (Economic and Commercial News, 1976, 6(52), 9).

Conversion of Rust into Protective Coating

A coating composition, which converts rust formed on mild steel surface into a black, hard protective coating, has been developed by the Central Electrochemical Research Institute, Karaikudi. (Economic and Commercial News, 1976, 6(51), 10).

Six Rural Areas for Technology Transfer

The Council for Application and Extension of Technology to Rural India (CAETRI) has identified six rural areas to establish a network of demonstration - cum - production complexes in collaboration with private sector industrialists. These are Palra (Rohtak district) and Sultanpur (Gurgaon district) in Haryana; the rural belt near Bombay; the Kuchaman Road area (Nagaur district) in Rajasthan; Bahadurgarh (Bulandshahr district) in Uttar Pradesh and Patparganj in Union Territory of Delhi. Detailed socio-economic surveys have been made in these areas and the services of interested industrialists and requisite technical know-hows, etc. have been obtained. (Data India, Dec. 6-12, 1976, 789).

KEYWORD INDEX

Numbers refer to entries

- Acid, acetic
 - from furfural, 100
- Acid, Boric
 - from Borax, 57
- Acid, sulphuric, 57
- Acid, sulphuric
 - recent advances in production, 55
- Active carbon, 52
- Active carbon
 - for adsorption or recovery of iodine from aqueous sol: , 54
- Activated carbon
 - from undersized particles of coconut shell, 101
- Alloys, nickel-cadmium
 - from acetate bath, 74
- Alternative fuel, 92
- Anacardium occidentale,
 - cardanol from shell liquid, 33
- Anogeissus latifolia
 - for pulp, 77
- Bajra
 - Leaf protein from, 27
- Bambusa
 - mineral content of scrap of, 99
- Benzol
 - from coal, 84
- Borax
 - Boric acid from, 57
- Brassica campestris, 24
- Brassica juncea, 24
- Brassica napus, 24
- Brassica nigra
 - leaf protein from, 27
- Brassica rapa
 - leaf protein from, 27
- Brassica seeds
 - chemical constituents of, 24
- Breeding values of
 - Haryana Bulls, 6
- Brine, Petroleum oil well
 - Iodine from, 105
- Broilers, flavour
 - effect of diet containing peanut, 8
- Bulls, Haryana
 - breeding values of, 6
- Bulls, scrub,
 - sterilization of, 2
- Calcium sulphide
 - from marine gypsum and Kutch lignite, 56
- Caprolactam
 - recovery from nylon-6 waste, 104
- Carbon, active, 52
- Carbon, active
 - for adsorption or recovery of Iodine from aqueous soln., 54
- Carbon activated
 - from undersized particles of coconut shell, 101
- Carbon cloth
 - chemistry, technology and utility,
- Carbonfibre
 - reinforced thermoplastics, 63
- Carbon fibres
 - chemistry, technology, and utility,
- Carbon monoxide, 83
- Carbon technology, 52
- Carcasses
 - utilisation of, 38
- Cardanol
 - recovery from cashew nut shell liquid, 33
- Cashewnut shell liquid
 - recovery of cardanol from, 33
- Candectomy
 - candectomy of scrub bulls, 2
- Caustic soda recovery
 - in textile industry, 94

- Cement,
 - from coal, 81
- Chemicals
 - from coal, 84
 - inorganic
 - organic, 51
- Chemical constituents
 - oil seeds of Brassica spp., 24
- Chloroethylphosphoric acid
 - in apple fruit maturation, 48
- Chlorothalonil (tetrachloroisothale-
nitrite) a fungicide
 - affecting apple fruit
maturation, 48
- Cloistanthus cellinus
 - for pulp, 77
- Coal,
 - benzol from, 84
- Coal,
 - cement from, 81
- Coal,
 - chemicals, 83, 84
- Coal
 - chemicals - Textile dyes from, 82
- Coal,
 - coking, 83
- Coal,
 - eye, 85
- Coal,
 - fertilizer, 86
- Coal,
 - gasification, 88
- Coal
 - naphthelene oil from, 84
- Coal,
 - oil from, 83
- Coal
 - wash oil from, 84
- Coal
 - pharmaceuticals from, 83, 84
- Coal,
 - taracids from, 84
- Coal
 - utilization, 87
- Cocoa
 - production in 1975-76, 11
- Coconut
 - industry, 34
- Coconut
 - pest management of, 20
- Coconut,
 - research in India for the
last sixty years, 21
- Coconut
 - root wilt diseases of, 22
- Coconut shell, undersized particles
 - for production of activated
carbons, 101
- Cocos nucifera,
 - pest management of, 20
- Cocos nucifera,
 - problem of the industry, 34
- Cocos nucifera,
 - root wilt disease of, 22
- Cocos nucifera
 - shells for production of
activated charcoal, 101
- Coffee
 - insect pests on, 13
- Coffee
 - production of, 10
- Coffee,
 - white stem borer on, 12
- Computers, micro, 67
- Copper refining
 - for selenium & tellurium, 107
- Cotton linters
 - from cotton seed after ginning, 103
- Crushed bones,
 - export of, 43
- Crotalaria juncea
 - spray of giberollic acid and
indole acetic acid on, 50
- Data processing equipment, 67
- Di-calcium phosphate
 - by-product from ossein production, 6
- Diesel oil,
 - gobar gas to reduce consumption of, 4
- Diospyros melanoxylon
 - for pulp, 77

- Hindustan Machine Tools,
Bangalore 75
- Hybrid napier
leaf protein from, 27
- Hydrogen, 83
- IFFCO,
role in fertilizer technology, 49
- Indian oil corporation (IOC), 92
- Indole acetic acid
spray on Phaseolus aureus
P. mungo and Crotalaria juncea
50
- Insecticide
for leaf borer on , 13
- Insect pests,
on coffee, 12
- Institute for carpet technology, 46
- Iodine,
adsorption or recovery of, 54
- Iodine,
in Indian petroleum oil well
brines, 105
- Know-how from CSIR laboratories, 53.
- Lamp shade
from parchment leather, 37
- Leathers, garment
preparation of, 36
- Leather, parchment
for lamp shade, 37
- Lignin
from paper & pulp mills in the
compounding of rubbers, 108
- Lignite, kutch
calcium sulphide from, 56
- Livestock feed
from agro-industrial byproducts,
3
- Livestock,
ghee during heat treatment, 35
- Low-sulphur heavy stock (LSHS), 92
- Lucerne,
protein, phosphorus & calcium
content of , 28
- Luffa acutangula Poem
yield & quality of fruits as
affected by growth regulants &
nitrogen, 31
- Madhuca longifolia var.
lotifolia, for pulp, 77
- Maleic anhydride
India's first plant, 59
- Maleic hydrazide
production of, 64
- Man-made fibres, 96
- Mech-Engg. Dept, I.I.T., Bombay
gobar gas for diesel unit, 44
- Machine tools,
manufacture of, 75
- Manure, farm yard,
for solanum tuberosum L, 16
- Meat
from rabbit, 40
- Meat preparations
demand of, 39
- Medicago sativa L.,
Protein, phosphorus and calcium
content of, 28
- Metallic products, 53
- Methane, 83
- Milk production in
~~crossbreeds~~ of cattle
different breeds of cattle
red sindhi
sahiwal
tharparkar, 4
- Millet,
mineral content of straw of, 99
- Moringa oleifera
fatty acid composition of, 30
- Moringa concanensis
fatty acid composition of, 30
- Morus alba
cultivation for sericulture in
India, 42
- Musa sp.,
mineral contents of trunk of, 99

- Mutton,
of sheep, mandya, 1
- Naphthelene oil
from coal, 84
- National Chemical Laboratory
Poona (NCL)
Know-how for production of pulps
and paper, 25
- Natural fibres, 96
- Nickel plant, forest, 90
- Nickel reserves, 90
- Nuclear energy, 72
- Nutritive value, cattle feed, 5
- Nylon
fibre, synthetic, 95
- Nylon-6 waste
recovery of caprolactam from, 104
- Oil palm, 76
- Oilseeds,
world production of, 18
- Oil, wash
from coal, 84
- Oleo resin
from Pinus sp., 79
- Oryza sativa
mineral content of husk of, 99
- Oxalic acid
from Terminalia spp., 80
- P-acetamol
production of, 58
- Palm oil sludge
substitute of petroleum grease, 17
- p-anisidine
production of, 58
- Paper making
for Elaeis guineensis Jacq, 76
- Peanuts
effect on the flavour of
broilers, 8
- Pennisetum purpureum
leaf protein from, 27
- Pennisetum typhoides Hm
leaf protein from, 27
- Pests,
on coconut, 20
- Pesticides, 51
- Petroleum exploration, 72
- Petroleum grease
substitute for palm oil sludge, 17
- Petroleum statistics, 91
- Pharmaceutical industry
raw materials from coal, 83
- Pharmaceuticals
from coal, 84
- Phaseolus aconitifolius
spray of gibberellic acid & indole
acetic acid on, 50
- Phaseolus calcaratus Roxb,
nutritive value as fodder of, 26
- Phaseolus mungo
spray of gibberellic acid and indole
acetic acid on, 50
- Phenacetin
production of, 58
- Pinus caribaea
seed grading effects on germination
growth of, 78
- Pinus elliotii
Dleo.resin from, 79
- Pinus occarpa
seed grading effects on germination &
growth of, 8
- Pinus roxburghii
seed grading effects on germination
growth of, 78
- Pinus roxburghii
oleo-resin from, 79
- Pinus sylvestris
mineral content of wood of, 99
- Plastics technology, 62
- Pollution
by waste water, 106

- Poultry feed
 - from triticales for chicks, 9
- Poultry litter
 - feed for sheep, 5
- Potato
 - farmyard manure for, 16
- Power equipment, industry, 73
- Power plant industry, 73
- Production and trade of
 - power transformers, 69
- Production of bullet proof glass, 89
- Protein, leaf,
 - from Brassica nigra Koch
 - Brassica rapa L
 - Eleusine Cora coarctata Gaertn.
 - Pennisetum typhuroides Rich.
 - Pennisetum purpureum
 - P. typhusoides, 27
- Sheep skins
 - for garment leathers, 36
- Pulp and paper
 - industrial grade production
 - from Indian plants, 25
- Pulp packing, wrapping
 - kraft & corrugating medium, 77
- Rabbit
 - for meat, 40
- Rabbit
 - for skin, 40
- Ragi,
 - leaf protein from, 27
- Recycling
 - from sodium sulphate, 57
- Regional Research Laboratory, Jorhat
- Regional Research Laboratory, Hyderabad
 - Know-how for production of pulp & paper, 25
- Resins, ~~howolac~~ epoxy, 61
- Rubber, industrial, 62
- Rubber-vulcanization
 - by utilizing lignins, 108
- Rubber technology, 62
- Saccharum officinarum
 - autumn planting alongwith intercropping of, 14
- Saccharum officinarum
 - effect of glyphosine on sugarcane quality, 15
- Santa Cruz electronic export processing zone (SEEPZ), 70
- Saw dust, 102
- Socle cereale, 9
- Selenium
 - from anode slimes, 107
- Sericulture, 41
- Sericulture
 - labour intensive industry, 42
- Sheep, mandya, 1
- Sheep skins,
 - for garment leathers, 36
- Skin
 - from rabbit, 40
- Sodium sulphate, 57
- Solar cabinet drier
 - for dehydration of fruits, 32
- Solanum tuberosum var. Kufri
 - effect of farmyard manure on, 16
- Solvent extraction industry, 98
- Soya bean
 - leaves, 47
- Statistics: petroleum, 91
- Sterilization
 - of scrub bulls, 2
- Structural plastics, 61
- Sunflower,
 - economics of, 19
- Sunflower,
 - prospects in India, 23
- Synthetic fibres, 96
- Synthetic fibres
 - from petro-chemicals, 97
- Tanning with
 - Aluminium
 - chromium salts, 36

Tar acids
 from coal, 84
 Tellurium,
 from anode slimes, 107
Terminalia spp.
 oxalic acid from, 80
Terminalia cariaceae
 for pulp, 77
 Tetrachloroisothalonitrile
 a fungicide, 48
 Textile dyes
 from coal chemicals, 82
 Textile industry
 cost reduction in chemical processes, 93
 Thermoplastics
 carbon fiber reinforced, 63
 Tiles
 Acoustic
 flame proof
 sound proof
 weather proof, 102
 Tomato-pomace
 feed for sheep, 3
 Transformers, power, 69
 Triticale,
 nutritive value of, 9
Triticum durum, 9
 Turnip,
 leaf protein from, 27

Ultrasonic clearers, mini. 68

Waste glass, 102
 Waste products - agricultural
 furfural from, 100
 Waste products - industrial
 cotton linters, 103

Waste products-industrial.
 fibro-cellular from Banana trunk,
 groundnut husk, paddy husk, mi
 straw, bamboo scrap & deal wood
 Waste products-industrial recovery
 caprolactam from nylon-6 waste, 1
 Waste products-industrial
 selenium & tellurium recovery fro
 anode slimes, a byproduct of co
 refineries, 107
 Waste utilization
 Indian petroleum oil well brines,
 Waste utilization
 lignins from paper pulp mills in
 compounding of rubbers, 108
 Waste water,
 industrial, 106
 for industry by desalination of s
 Water, fresh
 for industry by desalination of s
 Water, 66
 desalination of, 66
 Water, sea:
 desalination of, 66
 Woollencarpets,
 exports of, 46
 Wool production
 effect of fodder from spear glass

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